

WHAT IS CLAIMED IS:

1. A planar motor comprising: a stator having a coil; and a mover having a magnetic flux generator, the
5 planar motor moving the mover on a movement plane,
further comprising:

a controller that detects position information of the mover based on information concerning an inductance of the coil, the inductance varying in accordance with
10 the relative-position relation between the stator and the mover.

2. A planar motor according to claim 1,
wherein the stator comprises a plurality of coils,
15 and

wherein the controller detects position information of the mover based on an inductance distribution with respect to the plurality of coils, the inductance distribution being generated in accordance with the
20 relative-position relation between the stator and the mover.

3. A planar motor according to claim 2,
wherein the stator comprises a coil-supporting
25 member that is made of a magnetic material and that supports the plurality of coils.

4. A planar motor according to claim 1,

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13. A stage unit comprising:
a planar motor according to any of claims 1 through
12; and
a stage member connected with the mover.

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14. A stage unit comprising:
a stage member moving on a movement plane;
a driving unit comprising: a mover that has a
magnetic flux generator and that is provided on the stage
10 member and a stator having a plurality of coils, the
driving unit driving the stage member by electromagnetic
force;
an inductance measurement unit to measure
inductances of the coils; and
15 a controller to control respective electric currents
supplied to the plurality of coils based on measurement
results by the inductance measurement unit.

15. A stage unit according to claim 14,
20 wherein the magnetic flux generator comprises a
plurality of magnets magnetized in a direction almost
perpendicular to the movement plane.

16. A stage unit according to claim 15,
25 wherein the stage member is made of a non-magnetic
material, and

wherein the magnetic flux generator further
comprises a magnet-supporting member that is made of a

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17. A stage unit according to claim 14,
5 wherein the magnetic flux generator comprises a plurality of magnets magnetized in a direction not perpendicular to the movement plane.

19. A stage unit according to claim 18, further
15 comprising:

wherein the controller controls respective electric currents supplied to the plurality of coils based on at least one of a detection result by the position detection unit and a set of measurement results by the inductance measurement unit.

20. A stage unit according to claim 19,
25 wherein when the position detection unit can detect position of the stage member, the controller controls position of the stage member by controlling respective electric currents supplied to the plurality of coils

based on a detection result by the position detection unit, and

wherein when the position detection unit cannot detect position of the stage member, the controller
5 controls position of the stage member by controlling respective electric currents supplied to the plurality of coils based on measurement results by the inductance measurement unit.

10 21. An exposure apparatus comprising:
an illumination system sending out illumination light for exposure;
a stage unit according to claim 13 on which an object to be arranged in a path of the illumination light
15 is mounted.

Sub 17 22. An exposure apparatus comprising:
an illumination system sending out illumination light for exposure;
20 a stage unit according to any of claims 14 through 18, on which an object to be arranged in a path of the illumination light is mounted.

23. An exposure apparatus according to claim 22,
25 wherein the object is a substrate which is exposed by the illumination light, and onto which a predetermined pattern is transferred.

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24. An exposure apparatus comprising:
an illumination system sending out illumination
light for exposure;

5 a stage unit according to claim 19 or 20, on which
an object to be arranged in a path of the illumination
light is mounted.

25. An exposure apparatus according to claim 24,
wherein the object is a substrate which is exposed
10 by the illumination light, and onto which a predetermined
pattern is transferred.

26. An exposure apparatus according to claim 24,
wherein when the position detection unit can detect
15 position of the stage member, the controller controls
position of the stage member by controlling respective
electric currents supplied to the plurality of coils
based on a detection result by the position detection
unit, wherein when the position detection unit cannot
20 detect position of the stage member, the controller
controls position of the stage member by controlling
respective electric currents supplied to the plurality of
coils based on measurement results by the inductance
measurement unit, and

25 wherein upon exposure, when it is judged that the
reason why the position detection unit cannot detect
position of the stage member is the stage member being
out of a range over which the position detection unit can

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detect position thereof, the controller restores the stage member to within the detection range of the position detection unit based on measurement results by the inductance measurement unit.

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27. An exposure apparatus according to claim 26, wherein after restoration of the stage member, the controller continues to control position of the stage member for exposure based on a detection result by the position detection unit.

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28. An exposure apparatus according to claim 26, wherein after restoration of the stage member, the controller moves the stage member to an initial position based on a detection result by the position detection unit..

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29. An exposure apparatus according to claim 26, wherein when the position detection unit can detect position of the stage member, the controller controls position of the stage member by controlling respective electric currents supplied to the plurality of coils based on a detection result by the position detection unit, wherein when the position detection unit cannot detect position of the stage member, the controller controls position of the stage member by controlling respective electric currents supplied to the plurality of coils based on measurement results by the inductance

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wherein upon exposure, when the position detection unit cannot detect position of the stage member, the controller controls position of the stage member for exposure based on measurement results by the inductance measurement unit.

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apparatus according to claim 24.

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wherein the stator comprises a plurality of coils,
5 and

10 relation between the stator and the mover.

wherein the stator comprises a coil-supporting
15 member that is made of a magnetic material and that
supports the plurality of coils.

20 wherein inductances of the plurality of coils are
measured individually.

25 wherein the position information of the mover
includes at least one of a piece of position information
with respect to a first axis direction and a second axis
direction that define the movement plane, and a piece of

position information with respect to rotation about a third axis perpendicular to the first axis direction and the second axis direction.

5 38. A driving method of a planar motor according to claim 33,

 wherein an electric current supplied to the coil is controlled based on a detection result of position information of the mover.

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 39. A driving method of a planar motor according to claim 33,

 wherein the magnetic flux generator comprises a plurality of magnets magnetized in a direction almost
15 perpendicular to the movement plane.

 40. A driving method of a planar motor according to claim 39,

 wherein the magnetic flux generator further
20 comprises a magnet-supporting member that is made of a magnetic material and that supports the plurality of magnets.

 41. A driving method of a planar motor according to
25 claim 33,

 wherein the magnetic flux generator comprises a plurality of magnets magnetized in a direction not perpendicular to the movement plane.

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42. A driving method that drives a planar motor comprising: a stator having a coil; and a mover having a magnet, so as to move the mover on a movement plane,

5 wherein position of the mover is controlled based on information concerning an inductance of the coil, the inductance varying in accordance with the relative-position relation between the stator and the mover.

10 43. A driving method of a planar motor according to claim 42,

 wherein the stator comprises a plurality of coils, and

 wherein position of the mover is controlled based
15 on an inductance distribution with respect to the plurality of coils, the inductance distribution being generated in accordance with the relative-position relation between the stator and the mover.

20 44. A driving method of a planar motor according to claim 43,

 wherein inductances of the plurality of coils are measured individually.

Sub A37 25 45. A driving method that drives a stage unit comprising a planar motor which comprises a stator having a coil and a mover having a magnetic flux generator, and which moves the mover on a movement plane, and a stage

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member moving as one entity with the mover,

wherein upon moving the stage member is used a driving method of a planar motor according to any of claims 33 through 44.

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46. A driving method that drives a stage unit comprising a stage member moving on a movement plane and a driving unit comprising a mover which has a magnetic flux generator and which is provided on the stage member and a stator having a plurality of coils and driving the stage member by electromagnetic force,

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wherein respective electric currents supplied to the plurality of coils are controlled based on results of measuring inductances of the plurality of coils.

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47. A driving method of a stage unit according to claim 46,

wherein the magnetic flux generator comprises a plurality of magnets magnetized in a direction almost perpendicular to the movement plane.

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48. A driving method of a stage unit according to claim 47,

wherein the stage member is made of a non-magnetic material, and

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wherein the magnetic flux generator further comprises a magnet-supporting member that is made of a magnetic material and that supports the plurality of

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49. A driving method of a stage unit according to claim 46,

50. A driving method of a stage unit according to
 10 claim 46,

15 51. A driving method of a stage unit according to
claim 50,

20 wherein respective electric currents supplied to the plurality of coils are controlled based on at least one of a detection result by the position detection unit and a set of measurement results of the inductances.

wherein when the position detection unit can detect position of the stage member, position of the stage

wherein when the position detection unit cannot
5 detect position of the stage member, position of the
stage member is controlled by controlling respective
electric currents supplied to the plurality of coils
based on measurement results of the inductances.

15 wherein upon driving the stage unit is used a
driving method of a stage unit according to claim 45.

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55. An exposure method according to claim 54,
wherein the object is a substrate which is exposed by the

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wherein upon driving the stage unit is used a
10 driving method of a stage unit according to claim 51 or
52.

57. An exposure method according to claim 56,
wherein the object is a substrate which is exposed
15 by the illumination light, and onto which a predetermined
pattern is transferred.

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wherein upon exposure, when it is judged that the reason why the position detection unit cannot detect position of the stage member is the stage member being out of a range over which the position detection unit can
5 detect position thereof, the stage member is restored to within the detection range of the position detection unit based on measurement results of the inductances.

59. An exposure method according to claim 58,
10 wherein after restoration of the stage member, position of the stage member continues to be controlled for exposure based on a detection result by the position detection unit.

60. An exposure method according to claim 58,
15 wherein after restoration of the stage member, the stage member is moved to an initial position based on a detection result by the position detection unit.

61. An exposure method according to claim 56,
20 wherein when the position detection unit can detect position of the stage member, position of the stage member is controlled by controlling respective electric currents supplied to the plurality of coils based on a
25 result of detecting position of the stage member, wherein when the position detection unit cannot detect position of the stage member, position of the stage member is controlled by controlling respective electric currents

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wherein upon exposure, when the position detection unit cannot detect position of the stage member, position of the stage member is controlled for exposure based on measurement results of the inductances.

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